Complete Summary

GUIDELINE TITLE

Management of minor closed head injury in children.

BIBLIOGRAPHIC SOURCE(S)

American Academy of Pediatrics, American Academy of Family Physicians. Management of minor closed head injury in children. Pediatrics 1999 Dec;104(6):1407-15. [31 references]

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Minor head injury

GUIDELINE CATEGORY

Evaluation
Management

CLINICAL SPECIALTY

Critical Care
Emergency Medicine
Family Practice
Neurology
Pediatrics

INTENDED USERS

Advanced Practice Nurses
Allied Health Personnel
Nurses
Physician Assistants
Physicians

GUIDELINE OBJECTIVE(S)

To provide recommendations for the management of minor closed head injury in children

TARGET POPULATION

Previously neurologically healthy children of either sex 2 through 20 years of age, with isolated minor closed head injury.

This parameter defines children with minor closed head injury as those who have normal mental status at the initial examination, who have no abnormal or focal findings on neurologic (including fundoscopic) examination, and who have no physical evidence of skull fracture (such as hemotympanum, Battle's sign, or palpable bone depression).

This parameter also is intended to address children who may have experienced temporary loss of consciousness (duration less than one minute) with injury, may have had a seizure immediately after injury, may have vomited after injury, or may have exhibited signs and symptoms such as headache and lethargy. The treatment of these children is addressed by this parameter, provided that they seem to be normal as described in the preceding paragraph at the time of evaluation.

This parameter is not intended for victims of multiple trauma, for children with unobserved loss of consciousness, or for patients with known or suspected cervical spine injury. Children who may otherwise fulfill the criteria for minor closed head injury, but for whom this parameter is not intended include patients with a history of bleeding diatheses or neurologic disorders potentially aggravated by trauma (such as arteriovenous malformations or shunts), patients with suspected intentional head trauma (eg, suspected child abuse), or patients with a language barrier. The term brief loss of consciousness in this parameter refers to a duration of loss of consciousness of one minute or less. This parameter does not make any inference that the risk for intracranial injury changes with any specific length of unconsciousness lasting less than one minute.The treatment of children with loss of consciousness of longer duration is not addressed by this parameter. Finally, this parameter refers only to the management of children evaluated by a health care professional immediately or shortly after (within 24 hours) injury. This parameter is not intended for the management of children who are initially evaluated >24 hours after injury.

INTERVENTIONS AND PRACTICES CONSIDERED

1. History, physical and neurologic examination
2. Observation in the clinic, office, emergency department, or at home

3. Imaging modalities including, cranial computed tomography (CT) scanning, skull radiographs, magnetic resonance imaging (MRI)
4. Cranial CT scanning along with observation
5. Consultation with subspecialists

MAJOR OUTCOMES CONSIDERED

1. Sensitivity and specificity of different imaging modalities
2. Short and long-term impact of management options on subsequent child health, including measures of:
    - physical health 1 month after injury
    - school absenteeism
    - teacher-reported hyperactivity (activity and inattentiveness) 10 years after injury
    - school performance, cognitive ability, behavioral symptoms or impairment

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Hand-searches of Published Literature (Primary Sources)
Searches of Electronic Databases
Searches of Unpublished Data

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

A medical librarian undertook an initial search of several computerized databases, including MEDLINE (1966-1993) and Health, searching terms of head trauma and head injury, restricted to infancy, children, and adolescents. Four hundred twenty-two articles were identified.

Because of the lengthy period between the initial review of the literature and final approval of the guideline, a second literature review was performed to assure that the literature review was current. This literature review used the same search headings and targeted the period between January 1, 1993, and July 1, 1997. For this review, only an electronic search was performed. The review identified an additional 486 abstracts.

NUMBER OF SOURCE DOCUMENTS

- 422 articles were identified in the first search
- 486 abstracts were identified in the second search
- 108 articles were selected for detailed review, 75 of which were used in the development of evidence tables

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Not stated

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review with Evidence Tables

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

The literature review included the following salient aspects of minor head trauma in children:

- Prevalence of intracranial injury
- Sensitivity and specificity of different imaging modalities in detecting intracranial injury, including skull radiography, computed tomography (CT), and magnetic resonance imaging (MRI)
- Utility of early diagnosis of intracranial injury
- Effectiveness of alternative management strategies, and
- Impact of minor head injury on subsequent child health.

The data included for review met the following criteria:

- publication in a peer-reviewed journal,
- data related exclusively to children or was identifiable as being specifically related to children, and
- assurance that cases described in the article were comparable with the case described in the practice guideline.

Review articles and expert opinion were excluded.

Titles and abstracts were reviewed by 4 initial reviewers, including the subcommittee chairperson, American Academy of Pediatrics staff, and methodologic consultants, and articles were obtained when reviewers considered the title to be relevant. Through this process, 168 articles were identified. Articles were sent to subcommittee members with an article review form, which asked reviewers to categorize the study design, identify the study question, and abstract the data to enable data pooling and meta-analysis. In addition, reviewers were asked to check the article references to see whether additional sources could be found.

Of the initial 168 articles sent out, reviewers excluded 134 papers and included 34 papers in their reviews. An additional 125 references were identified through bibliography tracing, of which 30 were included for review by the epidemiologist/pediatrician consultants.

Of the 486 abstracts identified in the second search, 44 were selected for detailed review by the epidemiologist and 11 included in the evidence tables.

All articles included were abstracted by the epidemiologist/pediatrician consultants, and the data were compiled using summary tables and evidence

tables. Differences in case definition, outcome definition, and study samples precluded pooling of data to arrive at common estimates.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Not stated

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

One decision analysis has been published that assesses the cost-effectiveness of a particular strategy for the evaluation of head trauma. This analysis, although not limited to children, utilized much pediatric data in developing the probabilities required for the analysis. The authors recommend immediate computed tomography (CT) scanning for patients with abnormal clinical signs; for patients who are otherwise normal, these authors recommend skull radiography, with CT if radiographs are abnormal. If such a strategy were followed for 10,000 persons presenting with mild head trauma, of 10,000 individuals with head injuries, the 9,900 additional skull films and 250 CT scans would identify 6 or 7 additional cases of early intracranial hemorrhage.

METHOD OF GUIDELINE VALIDATION

External Peer Review
Internal Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

The practice parameter was reviewed by the American Academy of Family Physicians (AAFP) Commission on Clinical Policies and Research and individuals appointed by the AAFP and appropriate committees and sections of the American Academy of Pediatrics (AAP) including the Chapter Review Group, a focus group of office-based pediatricians representing each AAP District.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Excerpted by the National Guideline Clearinghouse (NGC)

Introduction/Definition

The parameter defines children who have minor closed head injury as those who have normal mental status at the initial examination, who have no abnormal or focal findings on neurologic (including fundoscopic) examination, and who have no physical evidence of skull fracture (such as hemotympanum, Battle's sign, or palpable bone depression).

The parameter also is intended to address children who may have experienced temporary loss of consciousness (duration less than one minute) with injury, may have had a seizure immediately after injury, may have vomited after injury, or may have exhibited signs and symptoms such as headache and lethargy. The treatment of these children is addressed by the parameter, provided that they seem to be normal as described in the preceding paragraph at the time of evaluation.

Initial Evaluation and Management of the Child With Minor Closed Head Injury and No Loss of Consciousness

Observation

For children with minor closed head injury and no loss of consciousness, a thorough history and appropriate physical and neurologic examination should be performed. Observation in the clinic, office, emergency department, or at home, under the care of a competent caregiver is recommended for children with minor closed head injury and no loss of consciousness. Observation implies regular monitoring by a competent adult who would be able to recognize abnormalities and to seek appropriate assistance. The use of cranial computed tomography (CT) scan, skull radiograph, or magnetic resonance imaging (MRI) is not recommended for children with minor closed head injury and no loss of consciousness.

If on examination the patient's condition appears normal (as outlined in the guideline document), no additional tests are needed and the child can be safely discharged to the care of a responsible caregiver. The recommended duration of observation is discussed in the section title "Disposition of the Child With Minor Head Injury." (See below).

Initial Evaluation of the Child With Minor Closed Head Injury With Brief Loss of Consciousness

Observation or Cranial Computed Tomography (CT) Scan

For children with minor closed head injury and brief loss of consciousness (<1 minute), a thorough history and an appropriate physical and neurologic examination should be performed.

Observation in the office, clinic, emergency department, hospital, or home under the care of a competent caregiver may be used to manage children with minor closed head injury with loss of consciousness. If the observer seems unable to follow or comply with the instructions for home observation, observation under the supervision of a health care practitioner is to be considered. Cranial CT scanning along with observation may also be used in the initial evaluation and

management of children with minor closed head injury with brief loss of consciousness.

The use of skull radiographs or MRI in the initial management of children with minor closed head injury and loss of consciousness is not recommended. However, there are limited situations in which MRI and skull radiography are options.

- Skull radiographs. If imaging is desired by the health care practitioner and if both CT and skull radiography are available, CT scanning is the imaging modality of choice, because of its increased sensitivity and specificity. When CT scanning is not readily available, skull radiographs may assist the practitioner to define the extent of injury and risk for intracranial injury. In this situation, there was Subcommittee consensus that, for a child who has suffered a minor closed head injury with loss of consciousness, skull radiographs are an acceptable management option. However, skull fractures may be detected on skull radiographs in the absence of intracranial injury, and occasionally intracranial injury is present despite the absence of a skull fracture detected on skull radiographs. These limitations should be considered by physicians who elect to use skull radiographs. Regardless of findings in skull films (should the physician elect to obtain them) close observation remains a cornerstone of patient management.
- MRI. Although MRI has been shown to be more sensitive than cranial CT in detecting certain types of intracranial abnormalities, CT is more sensitive for hyperacute and acute intracranial hemorrhage (especially subarachnoid hemorrhage). CT is more quickly and easily performed than MRI, and costs for CT scans generally are less than those for MRI. The consensus of the Subcommittee was that cranial CT offered substantial advantages over MRI in the acute care of children with minor closed head injury.

  As is the case with skull radiographs, there may be situations in which CT scanning is not readily available and the health care professional desires to obtain imaging studies. There was Subcommittee consensus that, for a child who has experienced minor closed head injury with loss of consciousness, MRI to evaluate the intracranial status of the child was an acceptable management option.

Disposition of Children With Minor Closed Head Injury

Children Managed by Observation Alone

Children who appear neurologically normal after minor closed head injury are at very low risk for subsequent deterioration in their condition and are unlikely to require medical intervention. Therefore, although observation is recommended for patients after the initial evaluation is completed, such observation may take place in many different settings. The strategy chosen by the health care practitioner may depend on the resources available for observation. Other factors, such as the distance and time it would take to reach appropriate care if the patient's clinical status worsened, may influence where observation occurs.

Historically, when hospitalization has been used to observe children after head injury, the length of stay averaged 12 to 48 hours. This practice was based on the

reasoning that most life-threatening complications occur within 24 hours after head injury. The Subcommittee believes that a prudent duration of observation would extend at least 24 hours, and could be accomplished in any combination of locations, including the emergency department, hospital, clinic, office, or home. However, it is important for physicians, parents, and other guardians to have a high index of suspicion about any change in the patient's clinical status for several days after the injury. Parents or guardians require careful instruction to seek medical attention if the patient's condition worsens at any time during the first several days after injury.

In all cases, the health care professional is to make a careful assessment of the parent or guardian's anticipated compliance with the instructions to monitor the patient. If the caregiver is incompetent, unavailable, intoxicated, or otherwise incapacitated, other provisions must be made to ensure adequate observation of the child. These provisions may differ based on the characteristics of each case.

The physician has an important role in educating the parents or guardians of children with minor closed head injury. Understandable, printed instructions should be given to the parent or guardian detailing how to monitor the patient and including information on how and when to seek medical attention if necessary. All children discharged should be released to the care of a reliable parent or guardian who has adequate transportation and who has the capability to seek medical attention if the child's condition worsens.

Children Evaluated by Cranial CT

Neurologically normal patients with normal cranial CT scans are at extremely low risk for subsequent problems. Although there are many reports of patients with head injuries in whom extradural or intracerebral bleeding developed after an initial stable clinical period, there are only a few reports of patients in whom extradural or intracerebral bleeding developed after a post-injury CT scan was interpreted as normal. Most often when such cases have been described, the patients had sustained a more severe initial head injury than the patient for whom this parameter is intended, and the neurologic status of the patients was not intact at the initial examination following the injury. A number of studies have demonstrated the safety of using cranial CT as a triage instrument for neurologically normal and clinically stable patients after minor closed head injury.

Patients may be discharged from the hospital for observation by a reliable observer if the post-injury CT scan is interpreted as normal. The length of observation should be similar to that described in the preceding section. If the cranial CT reveals abnormalities, proper disposition depends on a thorough consideration of the abnormalities and, when warranted, consultations with appropriate subspecialists.

CLINICAL ALGORITHM(S)

An algorithm for evaluation and triage of children and adolescents with minor head trauma is presented in the original guideline document. This algorithm presents recommendations and options in the context of direct patient care. Management is discussed for the initial evaluation of a child with minor closed head injury, and the disposition after evaluation.

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting the recommendations (i.e., case series, cohort study) is identified in evidence tables in the technical report that accompanies the guideline document. Recommendations are made based on the quality of scientific evidence. The literature on mild head trauma does not provide a sufficient scientific basis for evidence-based recommendations about most of the key issues in clinical management. In the absence of high-quality scientific evidence, subcommittee consensus is used as the basis for recommendations.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Appropriate initial evaluation and management may reduce the impact of minor closed head injury on subsequent child health.

POTENTIAL HARMS

Potential adverse consequences of routine brain imaging modalities such as computed tomography (CT) or magnetic resonance imaging (MRI) include side effects attributable to sedation or inappropriate interventions (e.g., medical, surgical, or other interventions based on incidental CT findings in asymptomatic children).

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- While developing this practice parameter, the Subcommittee attempted to find evidence of benefits resulting from 1 or more patient management options. However, at many points, adequate data were not available from the medical literature to provide guidance for the management of children with mild head injury. When such data were unavailable, the guideline developers did not make specific recommendations for physicians and other professionals but instead they presented a range of practice options deemed acceptable by the Subcommittee.
- The published data proved extremely limited for a number of study questions, and direct queries were placed to several authors for child-specific data. Because these data have not been formally published, the Subcommittee does not rest strong conclusions on them; when available, however, they are presented in the report.
- This practice parameter is not intended as a sole source of guidance for the management of children with minor closed head injuries. Rather, it is designed to assist physicians by providing an analytic framework for the evaluation and management of this condition. It is not intended to replace clinical judgment or establish a protocol for all patients with a minor head injury, and rarely will provide the only appropriate approach to the problem.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Patient-centeredness
Safety

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

American Academy of Pediatrics, American Academy of Family Physicians. Management of minor closed head injury in children. Pediatrics 1999 Dec;104(6):1407-15. [31 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

1999 Dec

GUIDELINE DEVELOPER(S)

American Academy of Family Physicians - Medical Specialty Society
American Academy of Pediatrics - Medical Specialty Society

SOURCE(S) OF FUNDING

American Academy of Pediatrics (AAP)

GUIDELINE COMMITTEE

- American Academy of Pediatrics (AAP) Committee on Quality Improvement
- American Academy of Family Physicians (AAFP) Commission on Clinical Policies and Research

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

AAP Subcommittee on Management of Minor Head Injury: John B. Coombs, MD (Chairperson); Hanan Bell, PhD (AAFP); Robert L. Davis, MD, MPH (AAP); Theodore G. Ganiats, MD (AAFP); Michael D. Hagen, MD (AAFP) (1992-1993); Jack Haller, MD (AAP); Charles J. Homer, MD, MPH (AAP); David M. Jaffee, MD (AAP); Hector James, MD (AAP); Larry Kleinman, MD (AAP) (1992-1994); Jane Knapp, MD (AAP); J. Michael Dean, MD (AAP); Patricia Nobel, MD (AAP); Sanford Schneider, MD (AAP).

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

AAP Policies are reviewed every 3 years by the authoring body, at which time a recommendation is made that the policy be retired, revised, or reaffirmed without change. Until the Board of Directors approves a revision or reaffirmation, or retires a statement, the current policy remains in effect.

GUIDELINE AVAILABILITY

Electronic copies: Available from the American Academy of Pediatrics (AAP) Policy Web site.

Print copies: Available from American Academy of Pediatrics, 141 Northwest Point Blvd., P.O. Box 927, Elk Grove Village, IL 60009-0927.

AVAILABILITY OF COMPANION DOCUMENTS

The following is available:

- Homer CJ, Kleinman L. Technical report: Minor head injury in children. Pediatrics 1999 Dec;104(6):e78.

Electronic copies: Available from the American Academy of Pediatrics (AAP) Policy Web site.

Print copies: Available from AAP, 141 Northwest Point Blvd., P.O. Box 927, Elk Grove Village, IL 60009-0927.

PATIENT RESOURCES

None available at this time.

NGC STATUS

This summary was completed by ECRI on July 25, 2000. The information was verified by the guideline developer on January 3, 2001.

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